4.5 NOISE

4.5.1 SETTING

INTRODUCTION

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ears decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

NOISE DESCRIPTORS AND PRINCIPLES

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. Rather, community noise varies continuously with time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day,

[1] All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants generally experience noise in the last category. There is no complete satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- a change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- a 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause adverse response

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion, hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate, approximately 4 to 6 dBA.

NOISE SOURCES AND LEVELS

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets, noise levels typically range from 65 to 70 DNL. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

SENSITIVE RECEPTORS

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication; physiological and psychological stress; and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. In general, residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and other outdoor recreation areas generally are more sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

4.5.2 REGULATORY SETTING

Noise issues are typically addressed in local General Plan policies, and local noise ordinance standards. The study area includes cities and municipalities encompassed by SCG/SDG&E's service territories in Southern California. Most of these cities and counties have adopted general plans. California Government Code Section 65302 lists the noise element as one of the seven essential elements cities and counties must include as part of their general plans. The General Plan noise element is a planning document that contains goals and policies to ensure compatible land use development with respect to noise. Cities and counties adopt noise ordinances for the implementation of the policies and standards in the general plan. Local General Plan policies and noise ordinance standards will be applicable to the proposed program when constructing or operating within the various jurisdictions.

4.5.3 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The analysis of the significance of impacts of the proposed program is based on the general criteria listed below. Based on the *CEQA Guidelines,* a project may be deemed to have a significant effect on the ambient noise environment if it would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- A substantial permanent increase in ambient noise levels in the study area above levels existing without the project;

- A substantial temporary or periodic increase in ambient noise levels in the study area above levels existing without the project

As described earlier, a change in noise levels of less than three dBA is not discernible to the general population; an increase in average noise levels of three dBA is considered barely perceptible, while an increase of five dBA is considered readily perceptible to most people (Caltrans, 1998). For evaluating permanent increases in ambient noise levels, the following specific criteria are used for this analysis: a change of 5 DNL or more is considered significant where the resultant noise level remains "normally acceptable" for the affected land uses and a change of 3 DNL or more is considered significant where the resultant noise level would exceed the maximum level considered "normally acceptable" for the affected land uses.

IMPACT MECHANISMS

The impact mechanisms of the program would be the temporary increase in noise from construction equipment during the excavation of portals for FIG installation to access the natural gas pipeline.

IMPACT ASSESMENT

Impact NOI-1: Construction activities could generate noise levels in excess of local standards during construction and FIG operation.

Construction activities for FIG installation could involve temporary noise sources associated with construction. Such noise sources are typically regulated on the local level through enforcement of noise ordinances, implementation of general plan policies, and imposition of conditions of approval for permits.

Normal construction activities, on average, would include the following equipment, the use of which would potentially result in noise impacts: two pickup trucks, a backhoe, one five-ton material-hauling truck, and one cement truck.

No long-term noise impacts are associated with the operation of the proposed program. Short-term noise impacts would be associated with the installation and construction activities, and occasional maintenance activities. However, these activities would be required to be in compliance with all applicable local noise ordinances. It should be noted that the most likely applications of FIG technology would be in developed areas. Abatement of installation-, construction-, and maintenance-related noise impacts in an urban environment would be accomplished in compliance with applicable noise ordinances. All equipment would be required to have sound-control devices no less effective than those provided on the original equipment. During the construction period, noise levels generated by construction for FIG installation would vary depending on the particular type, number, and duration of use of various pieces of construction equipment.

Most of the various jurisdictions through which FIG technologies would be implemented have set standard construction hours and, in some cases, have established construction equipment noise standards as part of either the local general plan noise element or the noise ordinance. As indicated below, SCG/SDG&E would require its contractors to comply with the construction hour limitations and equipment standards for all applicable jurisdictions. For construction in those jurisdictions where there are no specific construction-related standards, SCG/SDG&E would require its contractors to limit noisy construction activity to the hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday. Given these measures, the program would not expose persons to or generate noise levels in excess of standards established in local general plans or noise ordinances, or applicable standards of other agencies.

Mitigation Measure NOI-1a: SCG/SDG&E would require construction contractors to comply with the construction hours limitations and construction equipment standards set forth in the local general plan noise element and the noise ordinance of all applicable jurisdictions of cities and counties, or in compliance with conditions outlined in acquired permits from those applicable jurisdictions.

Mitigation Measure NOI-1b: To reduce daytime noise impacts due to construction, SCG/SDG&E shall require construction contractors to implement the following measures when operating adjacent to sensitive receptors in order to maintain compliance with local noise standards:

- **Equipment and trucks used for construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible);**
- **Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible; and**
- **Construction equipment shall be located as far from sensitive receptors as possible.**

Significance After Mitigation: Less than significant.

Impact NOI-2: Exposure of sensitive receptors to localized groundborne vibration and groundborne noise during FIG installation.

The program could involve temporary sources of groundborne vibration and groundborne noise during construction from operation of heavy equipment. During construction, operation of heavy equipment would generate localized groundborne vibration and groundborne noise that could be perceptible at any nearby residences or other sensitive uses in the immediate vicinity of FIG installation activities. However, since the duration of impact at any one location would be very brief (from one to three days) and since the impact would occur during less sensitive daytime hours, the impact from construction-related groundborne vibration and groundborne noise would not be significant.

Mitigation Measure: No mitigation required.

Impact NOI-3: Temporary and intermittent noise increases during FIG installation.

The program could result in temporary and intermittent noise increases due to construction. Construction-related equipment and activities for FIG installation are described above under Impact NOI-1. The effect of this noise would depend upon the level of noise that would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, and the existing noise levels at those sensitive uses. FIG installation would involve use of equipment that would typically generate noise levels in the 80 to 90 dBA range within 50 feet. It is possible that residential uses could be located as close as 20 to 30 feet from construction equipment. In some areas, intervening structures/sound walls, trees and berms (between the construction zone and residences) may provide some noise attenuation.

Background noise levels would vary depending upon the location of the pipeline access point. Even in urban areas where background noise levels are relatively high, the noise from construction equipment would be substantially above those background levels. Given compliance with local standards related to allowable construction hours (see **Impact NOI-1**), FIG installation would occur when a majority of people would be at work, but retired persons, people who work at home, and people caring for children in their homes could be annoyed by noise when construction activities occur in their immediate vicinity. However, the duration of impact for each sensitive receptor would likely be one to three days, from the commencement of site preparation to the completion of backfilling, and given the short duration of the impact, the temporary increase in noise due to FIG installation would not be significant.

Mitigation Measure: No mitigation required.
